

Circles with Sulphuret of
Potassium 265

to belong to certain fluids, namely, of sometimes giving balanced forces in circles of good conductors, and at other times not (853).

879. Even the metals themselves must in fact be forced into this constrained condition; for the effect at a point of contact, if there be *any at all*, must be the result of the *joint* and *mutual actions* of the bodies in contact. If therefore in the circuit, fig.

68, the contact forces are not balanced, it must be because of the deficient *joint* action of the lead and solution at *c*. If the metal and fluid were to act in their proper character, and as iron or nickel would do in the place of the lead, then the force there would be $< - 21$, whereas it is less, or according to the assumed numbers only $< - 10$. Now as there is no reason why the lead should have any superiority assigned to it over the solution, since the latter can give a balanced condition amongst good conductors in its proper situation as well as the former; how can this be, unless lead possess that strange character of sometimes giving equipoised contacts, and at other times not (853)?

880. If that be true of lead, it must be true of all the metals which, with this sulphuretted electrolyte, give circles producing currents; and this would include bismuth, copper, antimony, silver, cadmium, zinc, tin, etc., etc. With other electrolytic fluids iron and nickel would be included, and even gold, platinum, palladium; in fact all the bodies that can be made to yield in any way active voltaic circuits.

Then is it possible that this can be true, and yet not a single combination of this extensive class of bodies be producible that can give the current without chemical action (855), considered not as a result, but as a known and pre-existing force?

881. I will endeavour to avoid further statement of the arguments, but think myself bound to produce (787) a small proportion of the enormous body of facts which appear to me to bear evidence all in one direction.

882. *Bismuth*.—This metal, when associated with platinum, gold, or palladium in solution of the sulphuret of potassium, gives active circles, the bismuth being positive. In the course of less than half an hour the current ceases; but the circuit is still an excellent conductor of thermo

currents. Bismuth with iron or nickel produces the same final result with the reservation before made (814). Bismuth and lead give an active

¹ My numbers are assumed, and if other numbers were taken, the reasoning might be removed to contact *b*, or even to contact *a*, but the end of the argument would in every case be the same.